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ABSTRACT

This Environmental Education Teacher's Guide, developed for use in the junior high school, is designed to familiarize teachers with how an environmental education program can help in their teaching and in achieving the goals of the school. The suggested core activities in this guide are designed to be a motivating way of introducing junior high school students to a practical understanding of the human environment. The activities focus on those factors important in evaluating the compatibility of land uses with each other and with the natural environment. The practicality of the unit is enhanced by the application of facts and concepts to a developed river corridor. The activities have been devised to develop specific understandings, feelings, and skills. Basic concepts, attitudes, objectives, and skills are identified and a pre-post test is included to help the teacher assess educational outcomes. (BT)

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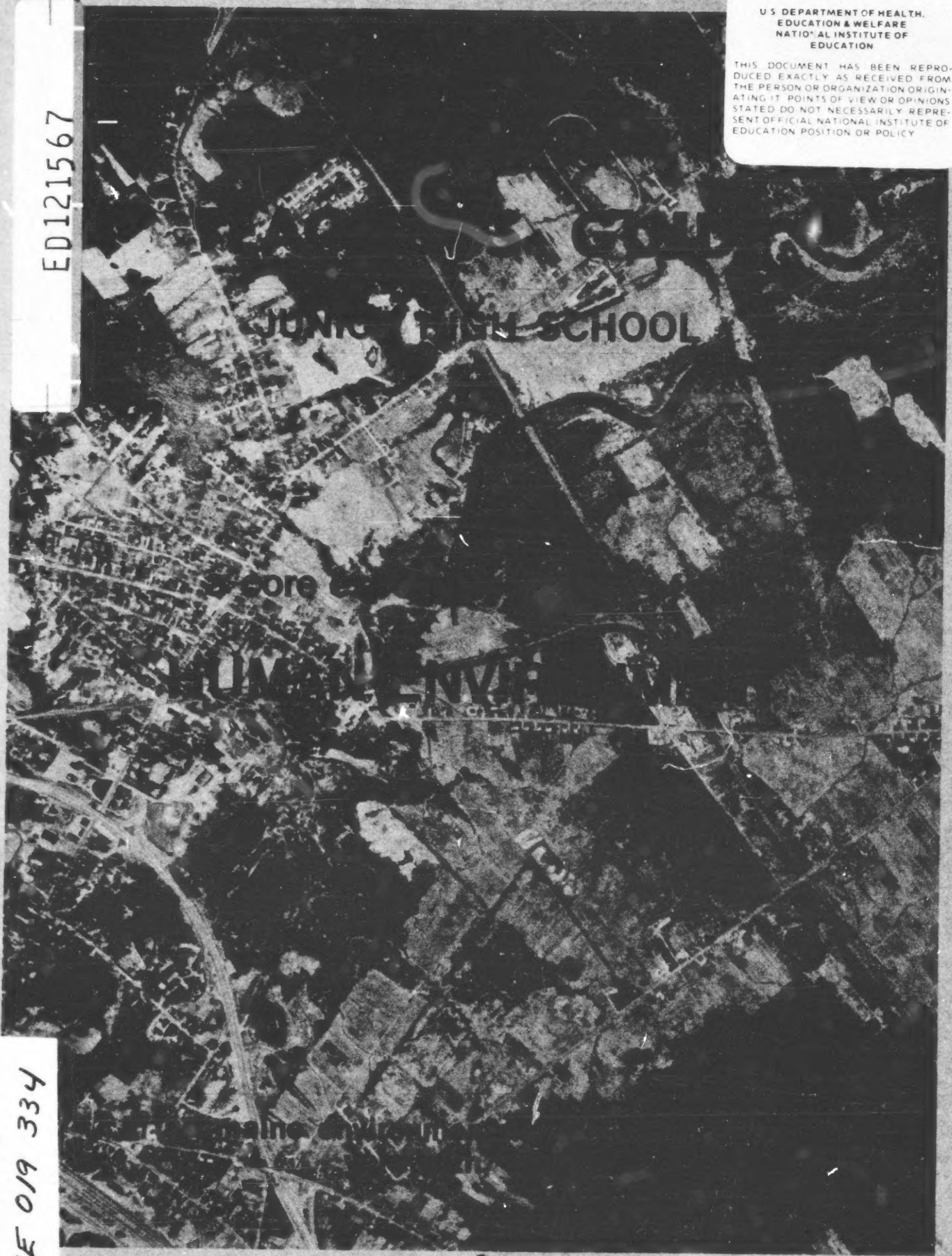

SE 019 334

JUNIOR HIGH SCHOOL

ENVIRONMENTAL EDUCATION TEACHER'S GUIDE

THE HUMAN ENVIRONMENT

Prepared by:

Dean B. Bennett

Wesley H. Willink

The Maine Environmental Education Project's
National Developer/Demonstration Program
E.S.E.A., Title III, 306

1975

Yarmouth, Maine, School Department

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To the Teacher:

This guide is designed to familiarize you specifically with how environmental education can help you in your instruction and in achieving the goals of the school.

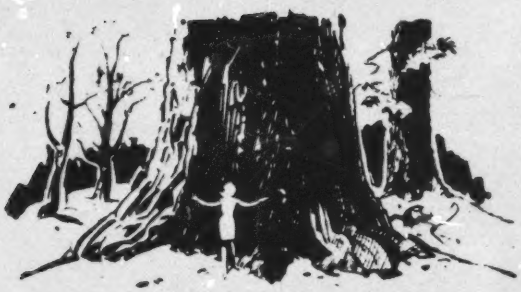
Environmental education aims at developing strong attitudes of concern for the quality of the natural and human environment and its role in meeting our needs - - attitudes which will lead to action to help prevent and resolve environmental problems.

The suggested core activities in this guide are designed to be a unique and motivating way of introducing junior high school students to a practical understanding of the human environment. This means more than definitions and facts. In particular, it focuses on those factors important in evaluating the compatibility of land uses with each other and with the natural environment. In addition, the practicality of the unit is enhanced by the application of facts and concepts to a developed river corridor through slides and aerial photos. The slide script and accompanying activities have been included as examples and should suggest ways to tailor the activities for your own particular community or region.

The activities have been devised to develop specific understandings, feelings and skills. They involve both classroom and field work. A pre and post test will enable the teacher to effectively assess the educational outcomes.

SECTION I

THE BIG IDEAS



THE BIG IDEAS

IN

ENVIRONMENTAL

EDUCATION

encompass

CONCEPTS

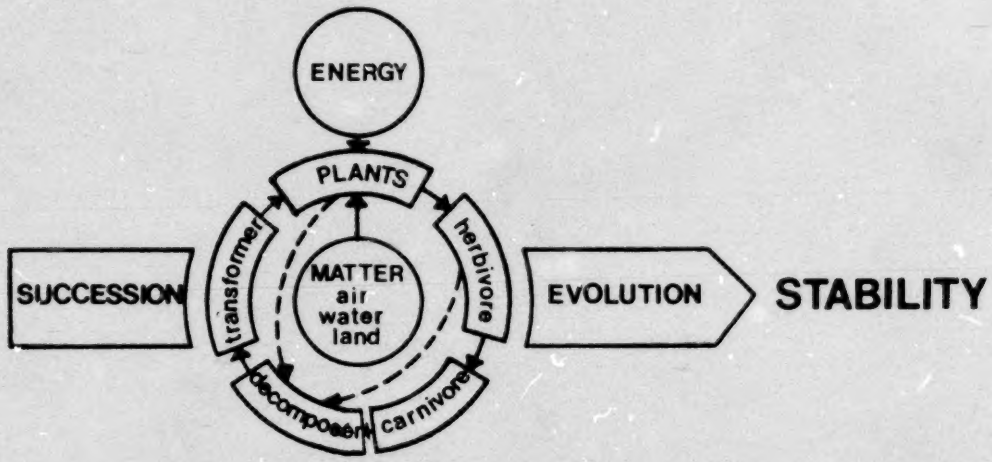
ATTITUDES

SKILLS

TEACHER ROLES

The more responsible and informed student is the student who understands and relates to his NATURAL SURROUNDINGS through the following basic concepts:

- The earth is a closed and finite system which functions as illustrated below:



- Each living and each non-living component of the environment has its own unique characteristics, its own unique relationships with other components, and its own pattern of change.

- The ability of a natural system to survive in a healthy state depends upon the amount of stability which it possesses. Stability depends upon:
  - a large number of different kinds of species present.
  - the kind and amount of food and matter present for consumption.
  - a large number of niches (roles) and habitats (places to live) for the species present.
  - the maximum cycling and recycling of matter.
  - the proper number of individuals present in the system.
  - the efficient use of energy.

Throughout this Teacher's Guide the following definitions of key terms will apply.

CONCEPTS

Concepts are abstract patterns derived from the inter-relationships of concrete facts. For example, trout eat mayflies is a fact; the food web of that pond is a concept. We believe that Environmental Education should aim to develop concepts in order that students be better able to understand the meaning of facts.

ATTITUDES

Attitudes are inclinations to view a concrete or an abstract object in terms of like or dislike, good or bad, right or wrong, etc. Attitudes are thought to consist of three essential parts or components. Two of these are feelings and understandings. If a student feels strongly enough toward the environment and its problems and possesses a sufficient amount of accurate information about it and how he can help resolve problems, his attitude may then contain a third component - a tendency or motivation to act.

It is believed that clusters of similar attitudes form a value.

SKILLS

The important skills in Environmental Education are those physical actions necessary to successfully carry out the process of discovery and investigation, evaluation and problem identification and problem solving.

The act of practicing these skills serves not only to allow a person to act on his values but also to contribute to a better quality environment.

To fully appreciate why man changes his natural surroundings, how he does this, and the results of these activities of human culture the student should understand and relate to the following basic concepts regarding the MAN-MADE ENVIRONMENT:

■ Man has physical, psychological, and social needs which must be met by his physical surroundings.

Physical needs include an environment which is:

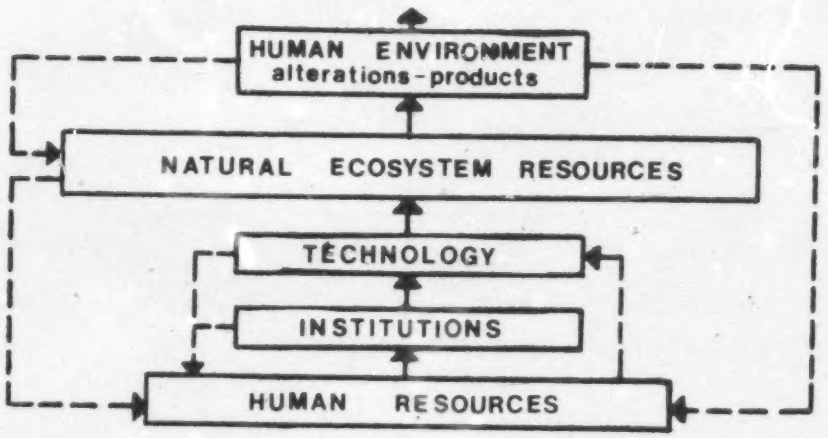
- useful and contains useful objects
- characterized by efficient objects
- safe and healthy
- lasting and has durable components

Psychological needs from our surroundings include:

- harmony
- stability and landmarks
- privacy
- variety
- areas for play and expression of aggression
- areas where one can learn
- personalized objects
- areas and things pleasant to look at and to be in

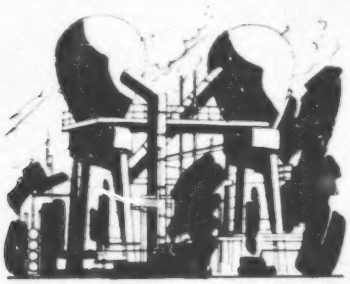
Social needs from our environment include:

- places to gather and meet
- places to compete and challenge the elements
- places where one can express himself to others through speaking or the creation and display of objects



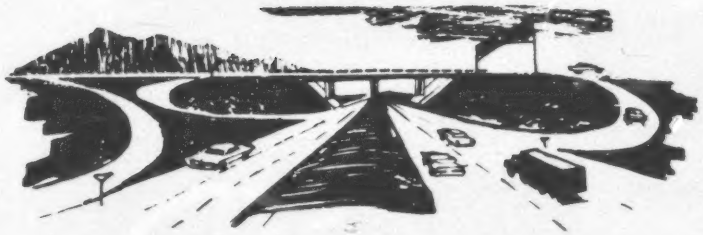
■ It is ultimately the Natural Environment which must be utilized to meet these human needs and assorted human wants. To do this, man works through the institutional and technological systems upon the raw and refined resources. The results are the products and alterations characteristic of the Human Environment. The process and components of man/nature interactions are illustrated above.

The developed Human Environment and its products determine the extent to which the individual's needs and wants are met. Closer examination shows this Human Environment to consist of these general types of uses:



PRODUCTION

HUMAN SETTLEMENTS



TRANSPORTATION/CIRCULATION

RECREATION

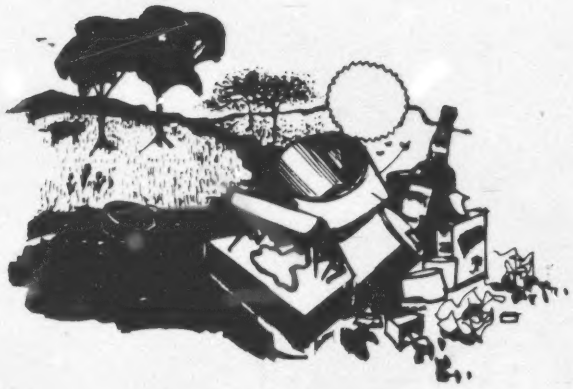
COMMUNITY SERVICES & UTILITIES

OPEN SPACE

■ However, this alteration of the Natural Environment to meet human needs and wants has a cost because the process is not totally efficient. Some of the more common spin-offs and undesirable side-effects are:

POLLUTION

CROWDING



WASTE

BLIGHT

Understanding these basic concepts of natural law, human intervention, and the results, both good and bad, of this intervention constitutes the factual basis of Environmental Education and lays the groundwork for personal value clarification and student activities.

Studies have shown that simply knowing the preceding concepts and facts alone does not imply that the student will have a greater appreciation and motivation or will have a tendency to work as an individual toward creating better quality surroundings.

To have this occur, the student must have coupled with the concepts and supportive facts the following feelings:

- A HEALTHY SELF-IMAGE

- A SENSE OF SOCIAL RESPONSIBILITY

- A SENSITIVITY TO THE ENVIRONMENT

- AN APPRECIATION OF LEARNING

The importance of both knowledge and feelings in determining the behavior exhibitied might be illustrated by the following:

Much Knowledge + Little Positive Feeling =
APATHETIC BEHAVIOR

Little Knowledge + High Positive Feeling =
EMOTIONAL BEHAVIOR

Much Knowledge + High Positive Feeling =
INTELLIGENT/EFFECTIVE
BEHAVIOR

No Knowledge + No Positive Feelings =
ALIVE?

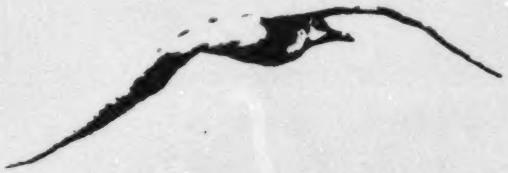
". . . only teachers who themselves are concerned about their environmental community will develop similar behavior in their students." *

* "What Kind of Environment Will Our Children Have?" published by the American Association of Colleges for Teacher Education, 1971.

Environmental Education presents to the teacher the opportunity to become an effective educator in the following three ways:

The FIRST ROLE of the teacher becomes one of helping students to DISCOVER their own environment. A teacher should set aside a part of the school year to go out into the community and on a first-nand basis learn about NATURAL ENVIRONMENTAL FEATURES such as:

- Geology
- Estuaries
- Floodplains
- Mammals
- Etc.



Investigations in the community which shed light on WHY the environment is changing relate to the human population and its characteristics such as:

- Migration patterns
- Government boundaries
- Housing
- Land ownership
- Historic Development
- Etc.

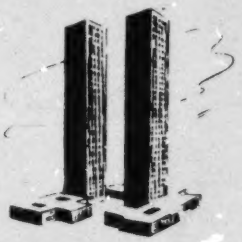
Investigations which show WHAT has happened to the natural ecosystem when man applies his culture can be found in Human Environmental Use Areas such as:

- Commercial locations
- Playgrounds
- Sewage treatment plants
- Energy production sites
- Industrial sites
- Public water supply
- Etc.

These investigations are rich additions in the existing curriculum and a complement to the standardized materials which cannot relate to each student's locale and situation. Environmental education must be indigenous education if it is to truly captivate the students interest and create motivation.

■ The SECOND ROLE of the teacher is to assist the students in EVALUATING the facts and information gathered in community-based research.

Students hear many conflicting ideas, theories and explanations about how the natural environment should be developed or preserved and how one human use in an area is more important than another. When investigating the local environment such feelings and attitudes are sure to arise. This cannot be avoided. But, there is a way to handle this.



All students should have opportunities to clarify and crystallize their own values. The teacher's role becomes one of:

- helping them to understand basic human and natural environmental needs, and
- assisting them to develop in their own minds the criteria by which to define quality surroundings.

It is important that balanced attitudes and values be encouraged. Tunnel vision, ill-founded prejudices, and obviously blatant disregarding of the facts should be discouraged.

The development of "mental yardsticks" by which to measure the quality of the environment results in the student's ability to identify opportunities for environmental maintenance and improvement. Without this ability to detect poor quality or to identify good quality in the environment based on carefully searched personal values, no person will consistently act and speak for the type of surroundings which he feels are needed.

A THIRD ROLE occurs for the teacher when the information generated and the values and attitudes explored lead to a high motivation on the part of the students to become actively involved. The teacher then can assist to facilitate PROBLEM SOLVING.

These problem-solving activities, properly managed by the teacher, can have significant returns in the form of increased understanding of concepts, acquisition of critical thinking, skills and clarification of attitudes and values.

There are many, many opportunities for problem-solving related to the student's environment. Problem-solving activities may take the form of:

1. Preventing something detrimental from occurring.
2. Correcting an existing detrimental condition.
3. Adding something which will enhance the function and quality of the environment.

In addition, the students may help resolve a selected problem or issue at one or two levels of involvement depending on the nature of the problem:

1. Communicating a suggested solution to others who might be in a better position to carry it out or whose support is needed. For example, giving a presentation, writing a letter, developing displays.
2. Actively carrying out a solution.
   For example, planting trees, monitoring an area to detect undesirable changes, developing a creative playground, etc.

Specific educational activities may be developed by both the students and teacher for each of the problem-solving steps listed below:

PROBLEM-SOLVING STEP	STUDENT/TEACHER ACTIVITIES	RESOURCE AIDS, ETC. NEEDED
1. Selecting a problem to resolve or improvement project to carry out.		
2. Inquring to become informed about the problem through investigation.		
3. Determining alternative solutions to the problem.		
4. Choosing the best solution after considering the consequences of each.		
5. Developing a plan of action.		
6. Implementing the plan of action.		
7. Evaluating the process and results.		

It is felt by many educators that the most educationally profitable step in the process above is number four - CHOOSING THE BEST SOLUTION AFTER CONSIDERING THE CONSEQUENCES OF EACH. This requires the exercising and development of thinking skills. In addition, choosing from alternatives is a process which helps the student clarify his feelings or values and opens up opportunities for a discussion of values. The clarification of values is seen as essential to helping people become consistent in their actions.

NOTE: Often issues and problems which students encounter have elements which may be controversial. The following guidelines for handling controversial issues are taken from the publication ENVIRONMENTAL EDUCATION PROGRAM, Toledo Public Schools, 1971, Compiled by William B. Stapp.

The classroom is the teacher's domain and it is imperative that the teacher use sound judgment and common sense in handling controversial issues. The following are guidelines to be considered in handling controversial issues in the classroom:

1. The classroom teacher must be aware of and take into account the (Regulations) of the Board of Education.

2. Encourage students to investigate environmental problems, but be cognizant and aware of their ramifications.

3. The teacher should know the times, the student body, and its cultural or sub-cultural make-up as they pertain to the issues at hand.

4. The teacher should assist pupils as a resource person to enable them to form intelligent and logical decisions.

5. The teacher should assist pupils in identifying the problems, collecting information, identifying alternative solutions, evaluating solutions, developing a plan of action, and working toward solutions.

6. The teacher shouldn't let personal feelings or prejudices be brought to bear upon the class. The students must be free to express themselves. However, upon request, it may be appropriate to make known views and rationale toward the end of the discussion period. The teacher should view his role as a resource person to assist students in seeking and clarifying different points of view.

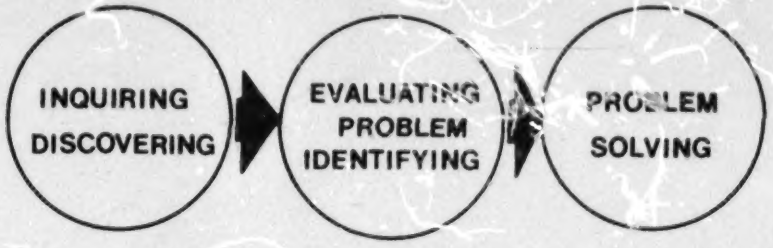
7. Strong emphasis should be placed upon the fact that a student may or may not agree with another's point of view but should respect that person's right to it.

8. Emphasize to the students the importance of considering all aspects of the argument before making decisions.

9. The teacher should strive to bring in several divergent views, references or resource persons.

10. The teacher should be sure that the issue is meaningful for the age group dealing with it.

Teachers who carry out these three roles of investigation, evaluation, and problem-solving have followed the process of Environmental Education as illustrated below:



The result of those environmental education experiences in which the teacher plays all three guiding roles and the students become personally and actively involved at all phases is the strengthening of the following skills:

1. Discovery/Inquiry related skills:
   a. Finding out what to investigate
   b. Gathering information on community environmental topics
   c. Compiling, recording, and reporting collected information

2. Evaluation/Problem Identification related skills:
   a. Formulating evaluative questions to use in judging the environment
   b. Finding answers to evaluative questions and comparing existing conditions to standards of quality

3. Problem-Solving related skills:
   a. Selecting a problem to resolve
   b. Inquiring to become informed about the problem
   c. Determining alternative solutions to the problem
   d. Making a decision (choosing) on the best solution after considering the consequences of each alternative
   e. Developing a plan of action to help resolve the problem
   f. Implementing the plan of action
   g. Evaluating the process and results

The next pages suggest a topic, format, and sequence for guiding two different types of Environmental Education experiences.

THE PROCESS OF
ENVIRONMENTAL EDUCATION

Natural Environment Example: Trees (plants)

Discovery - Inquiry	Evaluation - Problem Identification	Problem Solving
Classroom activities - Learn about the characteristics, interrelationships, changes, and uses of trees through lessons, books and publications, resource people, films, and other instructional aids.	Group or independent development of criteria to assess: 1) how well trees meet ecological needs, e.g., hold soil, prevent erosion, provide homes for wildlife, etc., and 2) how well trees meet human needs, e.g., physical needs, shade, etc.; social needs,, gathering places,; psychological needs, aesthetics, etc. Evaluate how well trees meet these needs in a real or hypothetical situation to identify environmental improvement opportunities.	Select a hypothetical problem, e.g., landscape a small park with trees. 1. Investigate the problem - needs, kinds of trees, etc. 2. Develop alternative solutions, plans for different plantings in a variety of locations. 3. Choose a solution after considering effects of each. 4. Develop plan of action - list steps and items needed. 5. Present plan for evaluation by others.
On-site activities - Investigate the trees on the school site and map and describe the kinds present on the site, their locations, sizes, condition, environmental effects, etc.	Develop evaluative criteria as above and assess extent present trees on the school site meet criteria. Identify: 1) existing conditions which need to be corrected - diseased trees, storm damaged trees, etc., 2) conditions which could be enhanced by planting trees, and 3) conditions threatening trees which should be prevented.	Select a tree problem to resolve on the school site; for example, white pine blister rust, etc. 1. Investigate causes, effects. 2. Develop alternative solutions. 3. Choose a solution. 4. Develop a plan of action. 5. Carry out plan. 6. Evaluate results.

THE PROCESS OF ENVIRONMENTAL EDUCATION

Man-Made Environment Example:

Walkways and Pathways (transportation-circulation areas)

Discovery - Inquiry	Evaluation - Problem Identification	Problem Solving
Classroom activities - Learn about the kinds, locations, functions, and characteristics of walkways and pathways through lessons, books and publications, resource people, films, and other instructional aids.	Individual and group development of criteria to assess: 1) effects of walkways and pathways on the natural ecosystem - altering drainage patterns, changing microclimate, removing vegetation, etc., and 2) how well walkways and pathways meet human needs: physical - safety, etc., psychological - aesthetics, etc., and social - bringing people together, etc. Evaluate walkways and pathways in a real or hypothetical landscape design plan.	Select a hypothetical problem, e.g., develop a plan for a new pathway. 1. Investigate the problem-needs, kinds of pathways, etc. 2. Develop alternative solutions - routes, kinds of pathways, etc. 3. Choose a solution after considering effects of each. 4. Develop plan of carrying out solution. 5. Present plan for evaluation by others.
On-site activities - Investigate walkways and pathways on the school site or in the community. Map and describe the kinds, locations, characteristics, conditions, and human and environmental effects.	Apply evaluative criteria as suggested above to walkways and pathways being assessed on site. Identify: 1) existing conditions which need to be corrected - erosion, potholes, rerouting, etc., 2) conditions which should be prevented - footwear erosion from overuse, encroachment of vegetation, etc., and 3) conditions which could be enhanced by creating new pathways, signs, etc.	Select a walkway or pathway problem to help resolve on the school site or in the community. 1. Investigate causes and effects. 2. Develop alternative solutions. 3. Choose a solution. 4. Develop a plan of action. 5. Carry out plan. 6. Evaluate results.

SECTION II

CORE ACTIVITIES

ENVIRONMENTAL EDUCATION CORE EXPERIENCES

The following experiences can be integrated into the existing junior high curriculum as a core which touches upon the major concepts, feelings and skills which may be developed in the study of the human environment. They will probably suggest additional enrichment activities which would expand beyond what the standardized curriculum is able to offer. They are not in any way to be viewed as inclusive. Rather, they are intended to be examples of the different types of techniques and emphases offered by environmental education.

It should be noticed that these core experiences are multidisciplinary and challenge the student to identify socially and environmentally significant content which orients itself around the problems of everyday living.

It is to be hoped that in the study of topics and issues dealing with personal and community concerns that the student will learn to weigh and balance evidence and be prepared to cope in his own way with these problems.

OBJECTIVES OF THE ACTIVITIES

Knowledge Objectives (Cognitive)

(Test item 1) 1. The student will be able to identify six (6) major ways land is used in the community.

(Test items 2-8) 2. The student will be able to identify major beneficial and detrimental effects of land areas.

(Test item 9) 3. The student will be able to identify the proper definitions of the following terms:

Flood Plain	Topography
Wetland	Slope
Land Use	Land Suitability

Values Objectives (Affective)

(Test item 10) 1. The student will more highly value human actions which tend to minimize detrimental effects on people and the natural environment.

Skill Objectives

Investigation

(Test item 10) 1. The student will be able to match land uses with key characteristics to investigate in order to gain an understanding of the major effects of land uses on the quality of the environment.

(Test item 11) 2. The student will be able to identify the proper ways of compiling the following data graphically:

a. Land Use
b. Topography
c. Soil Suitability
d. Flood Plain

Evaluation - Problem Identification

(Test item 12) 3. The student will be able to generally rate the compatibility of individual land uses with other land uses.

(Test item 13) 4. The student will be able to better utilize the overlay map for detecting existing and potential problems.

Problem-Solving

(Test item 14) 5. The student will be able to select and properly arrange a series of problem solving steps relating to a hypothetical land use problem.

INSTRUCTIONAL MATERIALS

- Pretest and post-test instruments
- Stereoscopes
- Aerial photo stereoscopic prints
- Land Use Map Student Worksheets
- Transparency of Land Use - Study Area Map Worksheet
- Human Settlement Maps
- Transparency of the Human Settlement Map with Answers to Activity Number Three
- Overlays for topography, flood hazard areas, land suitability and sewerage facilities
- Keys to Overlays
- Aerial photo slides
- Community Study Area land use slide set with script

The purpose of this exercise is to discover through discussion and observation the various ways in which humans use the land.

A. Listing Major Land Uses

Ask - what are the major ways we use land in our communities? Through discussion list on the chalkboard the major uses. (These are the major ways we alter or manage land areas to meet our needs). After the suggestions of uses have been exhausted, ask - which ones are similar and can they be placed in groups or categories? When completed with this activity you should have a listing something like the following but, perhaps, not as complete. (In any event, the six categories below provide a good workable method for grouping land uses.)

1) Production Areas

- Industrial
- Forest
- Agricultural
- Mining
- Power generation

2) Human Settlement Areas

- Residential
- Institutional (schools, libraries, post office, town offices, etc.)
- Commercial (shopping centers, stores, etc.)
- Historic (buildings, sites, monuments, etc.)
- Cemeteries

3) Open Space Areas

Relatively natural areas which should be protected and offer an opportunity to be in touch with nature. These may include:

- Outdoor study sites
- Preserves
- Buffer zones
- Scenic areas
- Cemeteries (In some places, these provide the only break in the highly developed landscape.)

4) Transportation Areas

- Highways
- Railways
- Airports
- Harbor facilities

5) Recreational Areas

Parks
Playgrounds
Playing fields for organized sports

6) Public Services and Utilities

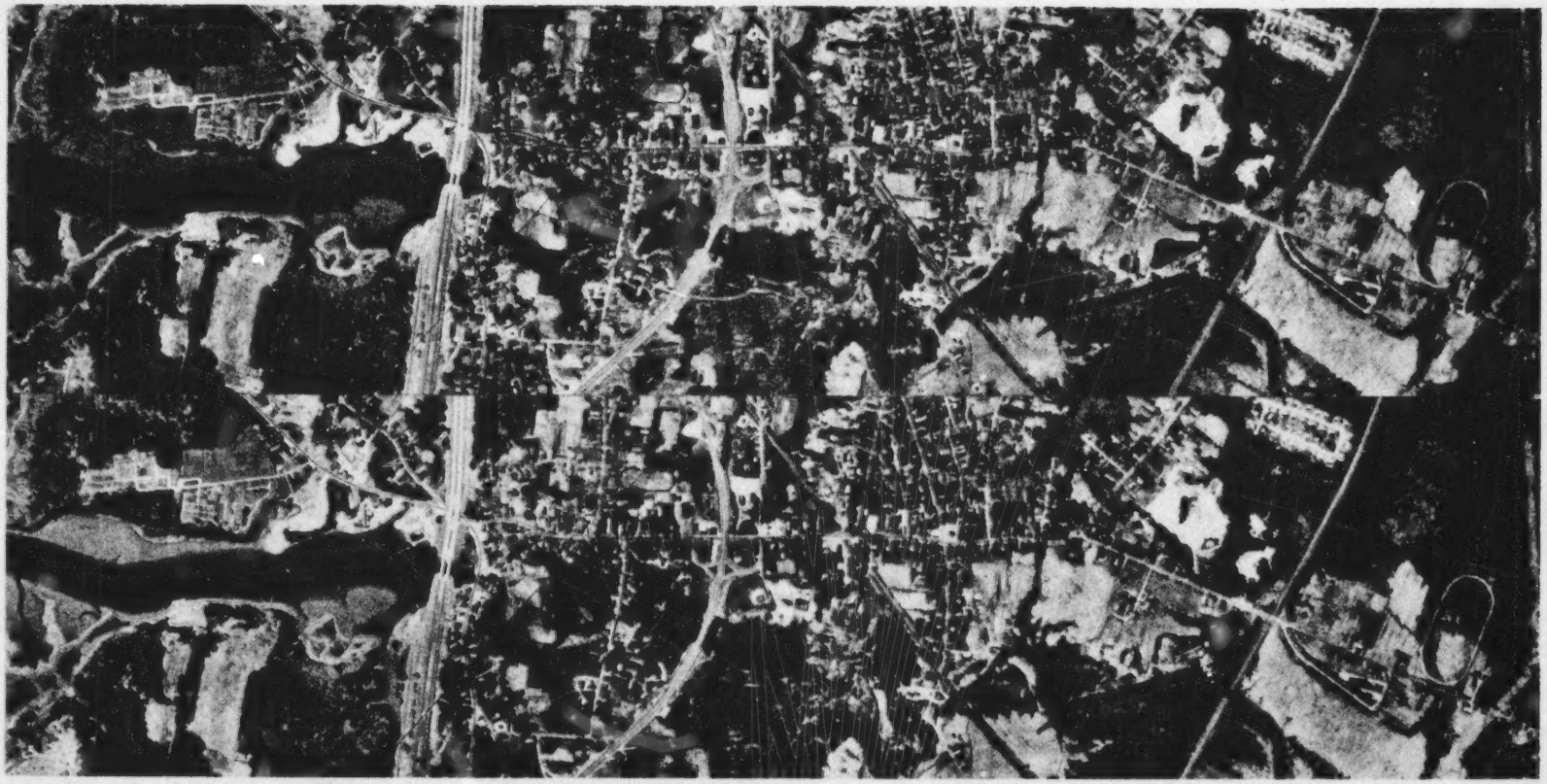
Power line rights-of-way
Dumps
Sewage disposal areas
Water supply facilities

B. Identifying and Locating Major Land Use Areas in the Study Community

Hand out the aerial photos and stereoscopes or show three slides of the study area.

Hand out the student worksheets. Each worksheet has many land use areas shaded and identified. Some areas are left unshaded and numbered. First, the students should check the identified land use areas. Secondly, they should complete the assignment as directed by the worksheet. Answers to the worksheet assignment are as follows:

1 = F/T
2 = R
3 = O
4 = T
5 = I
6 = FF



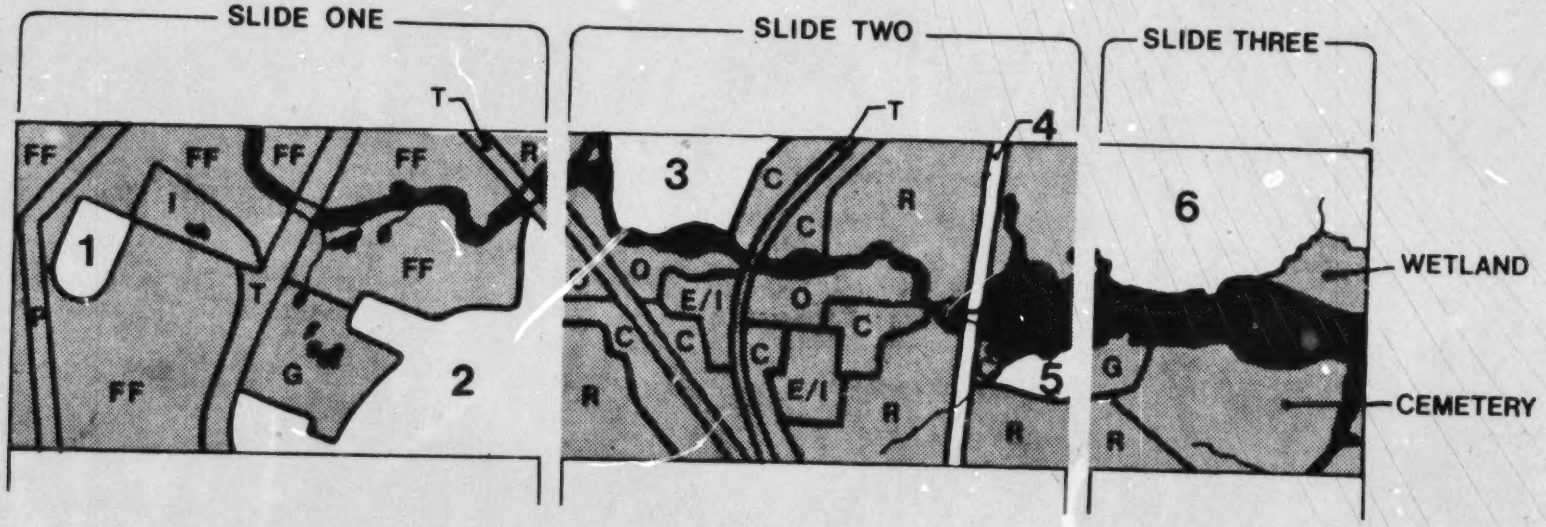
Yarmouth, Maine — Land Use Study
Royal River Corridor

IDENTIFIED
LAND USES

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

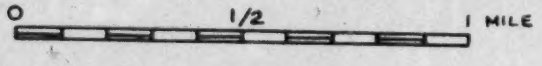
LEGEND

P	Power Lines
F/T	Recreational--Fields/Tracks
T	Major Highways/Railways
FF	Forest/Field/Farmland
I	Industrial
G	Gravel Pits
C	Commercial
R	Residential
E/I	Educational/Institutional
O	Open Space (undeveloped land managed for scenic beauty, recreation, education, etc.)



STUDENT WORKSHEET
YARMOUTH LAND USE STUDY

(For Use with Slides or Aerial Photo and Stereoscope)



DIRECTIONS: Using either slides or aerial photos with stereoscopes, identify the use of the six numbered land areas which are not shaded on the map above. Choose from the options in the legend. Put the correct letter symbol(s) in the appropriate blanks to show how each land area is being used.

CORE ACTIVITY NUMBER TWO

The purpose of this activity is to identify the beneficial and detrimental effects of various land uses and to evaluate the compatibility of the land use areas.

A. Listing Beneficial and Detrimental Effects of Various Land Uses

Through class discussion list the beneficial and detrimental effects on people and the environment which might be associated with each of the ten land use areas. (Note: Effects on the natural environment might relate to habitat for wildlife, soil erosion, vegetation, water and air quality, e.tc. Effects on people might relate to safety, durability, convenience, efficiency, usefulness, aesthetics, social relations, etc.)

B. Evaluating the Compatibility of Land Use Areas

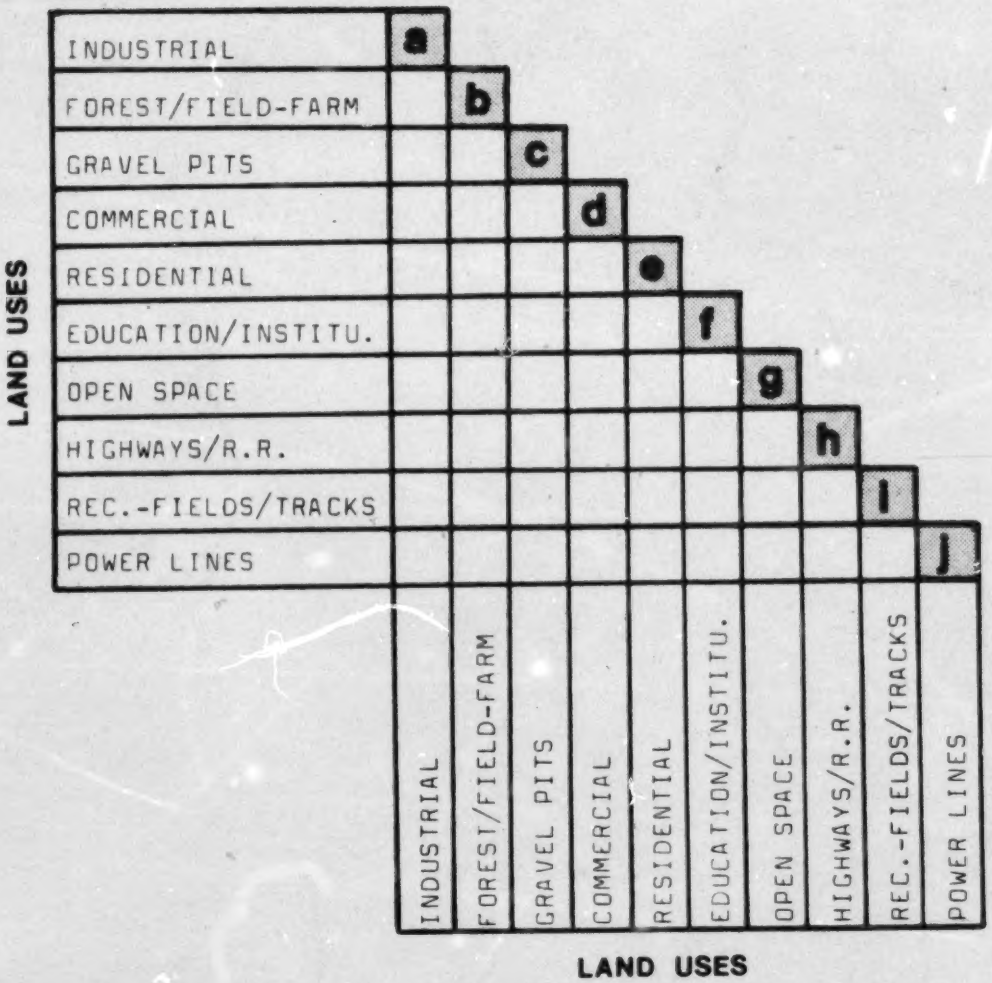
As a class, using the list of beneficial and detrimental effects identified in Part A, vote on the degree of compatibility of side-by-side land uses. Use the chart on the transparency to record the rating for each land use combination. This chart will help the class to make judgments on the compatibility of land uses in an orderly way. (See Figure 1 for transparency master.)

Directions:

1. To use the chart, start by comparing industrial (at the bottom of column a) with each of the other land uses listed up and down along the left side of the chart. Going up from the bottom, compare industrial with power lines, first. If industrial areas and power lines make a good combination place a '3' in the box.

   If there are no serious objections (neither particularly good nor bad, give it a '2'. If it is a bad combination, give it a '1'. Make the decision and rating after considering the beneficial and detrimental effects listed in Part A.

Figure 1



LAND USE COMPATIBILITY RATINGS

LEGEND

Good Combination = 3

Neither Good nor Bad Combination = 2

Bad Combination = 1

Going up the list next, compare industrial with Recreation-Fields/Tracks. Continue until industrial at the top of the list is reached. There is no box here since the same uses cannot be compared.

Continue until all land uses along the bottom of the chart have been rated with uses listed on the side.

2. To find out which uses are most compatible with all other uses, add the scores in column 'a' upward to the last box in the column. For columns 'b' through 'i', not only add the numbers in the columns but add all numbers in the horizontal row to the left of the top shaded box to the score. For column 'j' add all the scores across in the bottom horizontal row. Rank order the land uses according to the scores; the land use with the highest is most compatible with all other uses. The land use with the lowest score presents the most problems. What does this mean to planners?

3. Using the numbers in the completed chart, label all the bad combinations on the student worksheet Land Use Map. Label by drawing a circle on each "bad combination" boundary line. This may be demonstrated by the teacher on an overhead transparency.

CORE ACTIVITY NUMBER THREE

The purpose of this activity is to evaluate the compatibility of existing land uses with natural conditions.

A. Evaluating the Compatibility of Existing Land Uses with Natural Conditions

1. Topography Analysis

Locate three (3) slopes which are the highest and steepest by placing the Topographic Map overlay on the Human Settlement Map. Mark them (S). Also, locate the highest area on the map and label the general location (H). Summarize on the overhead transparency and discuss the effects of the highest and steepest areas on land uses.

2. Flood Hazard Analysis

Place the Flood Hazard Area Map overlay on the Human Settlement Map. Are there any buildings in the flood plain? If so, mark them with an (F). Discuss the effects on land use planning.

3. Land Suitability Analysis

Place the Land Suitability Map overlay on the Human Settlement Map.

1) Are there any buildings on slopes over 15%?
If so, how many? ____

2) Are there any buildings on unsuitable soils, such as tidal marsh?
If so, how many? _____

3) How many buildings are there on soils having severe limitations for development? _____

4) How many buildings are there on soils suitable only for development with sewer which are currently unsewered? _____

To check for this, place Sewerage Facilities Map overlay together with the Land Suitability overlay map and place both over the Human Settlement Map. Count the unsewered homes which are already in areas suitable for development only with public sewer.

Locate potential pollution problem areas and label these with the symbol (P).
Summarize on overhead transparency and discuss.

HUMAN SETTLEMENT MAP

(locations of existing structures)

Key to Overlays

A

TOPOGRAPHY

20 ft. Contour Intervals

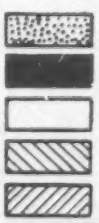
B

FLOOD HAZARD AREAS

100 year flood plain

C

LAND SUITABILITY



slopes over 15%

unsuitable soils, i.e., tidal marsh

severe limitations for development

suitable for development with sewer

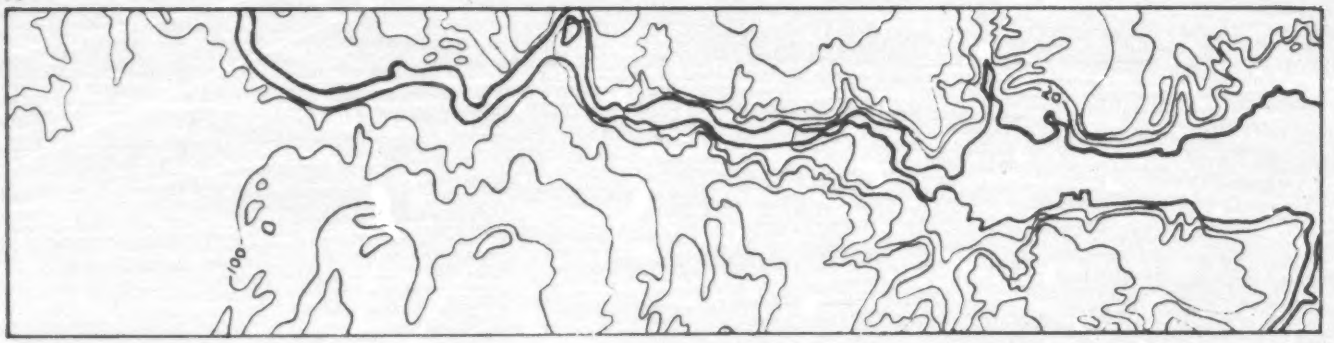
suitable for septic tank

D

SEWERAGE FACILITIES

OVERLAYS

A



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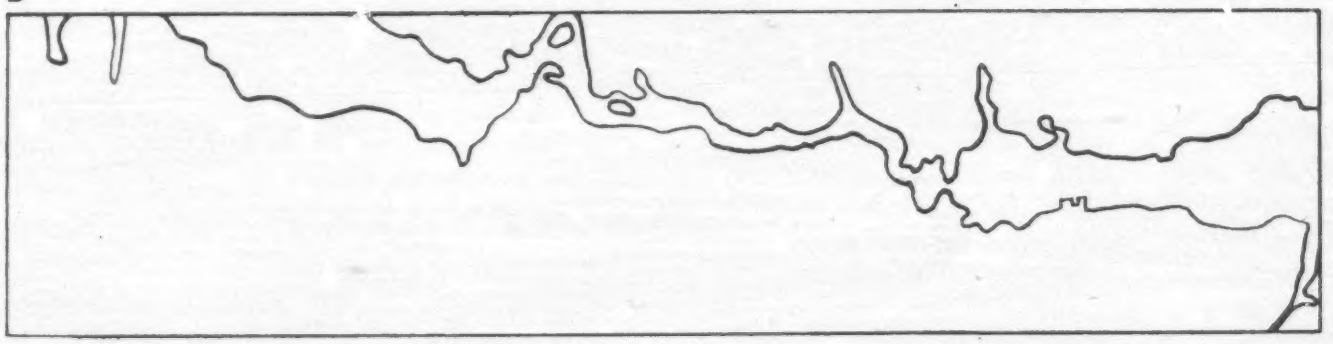

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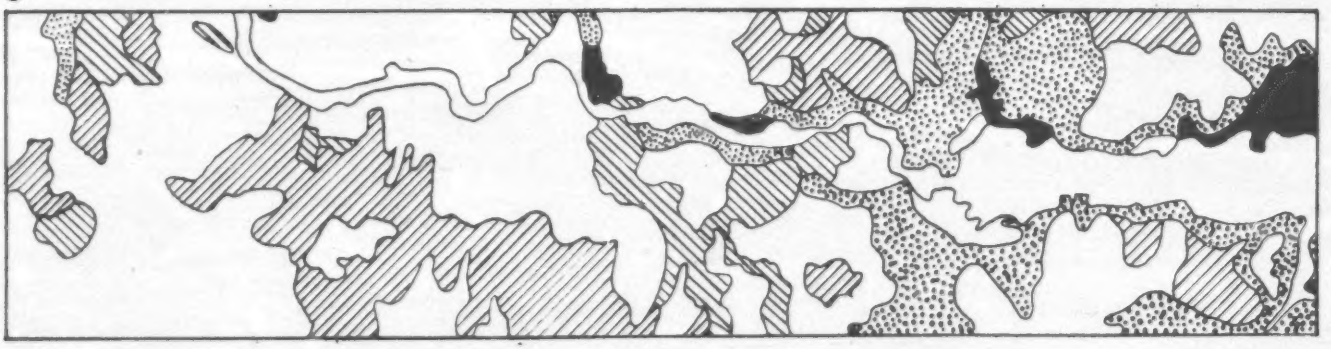
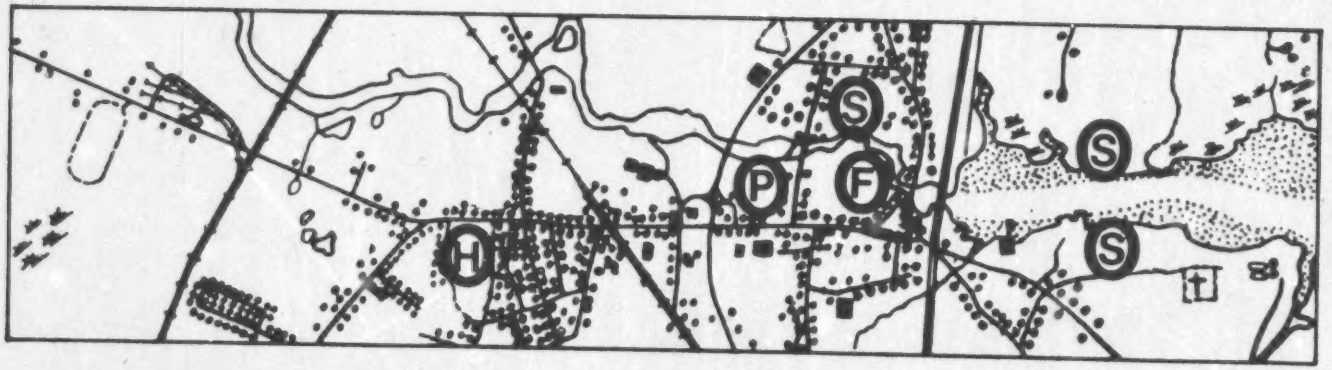


D



HUMAN SETTLEMENT MAP

(locations of existing structures)

ANSWERS TO CORE ACTIVITY NUMBER THREE

CORE ACTIVITY NUMBER FOUR

The purpose of this activity is to review the Royal River Corridor land use by means of a slide show and script.

Analysis of the Study Area Utilizing Slides

Observe the series of slides taken from the air and from the ground surface to obtain a better understanding of the study area. Refer to script and discussion questions.

YARMOUTH ROYAL RIVER CORRIDOR LAND USE

Slide Study Script

Introduction for the teacher:

Each slide in the set has been numbered in order of presentation. These numbers correspond to the numbers below. For each slide, the view it shows is given in parentheses and a brief narrative of explanation has been written including, in some cases, discussion or observation questions. As the teacher, you may read this script as the slides are shown stopping for analysis and discussion at your discretion.

1. (Yarmouth Center of town along the river - aerial)

   Looking south the Royal River is seen flowing through the center of town. This field trip, by slides, will allow you to study land uses in a community which has grown up along a river corridor.

2. (Power line right-of-way - aerial)

   Our trip will start at the northwest end of the study area by this power line right-of-way which we are flying over.

3. (Power line right-of-way)

This is the power line seen on the ground. What other uses does this area serve? (Wildlife habitat, recreation - snowmobiling, etc., foot trails, Christmas tree plantation, etc.)

4. (Pole yard - aerial)

Flying down the corridor on the south side of the river is the pole yard - an industry located not far from the power line. Why do you think it was located here? (Flat terrain, space, railroad)

5. (Pole yard)

In this view of the pole yard, what is the character of the land in this area? (Flat, low, rolling)

6. (Man-made Pond)

Moving down the road from the pole yard is a private man-made pond located near the river which is just behind it.

7. (Gravel Pit)

Across the road from the pond is an abandoned gravel pit. How might this affect the area? (Aesthetically, dangerous unstable banks, little opportunity for other uses, etc.) What possible uses might it serve? (Revegetate as an open space area, recreation, etc.)

8. (Housing Development)

To the west of the gravel pit is a housing development constructed around a roadway loop. From your observation of the kind of development this is, what can you say about how this might have affected the community. (Attractive to families with school children - increased pressure on schools, soils unsuitable for septic tanks - requiring sewering at town expense, drainage altered requiring expensive measures)

9. (Drainage Project)

Below the housing development this drainage project had to be undertaken at great expense. Why might this have been required? (Drainage patterns altered, increased run-off from paved areas, etc.)

10. (Old Church and Meeting House)

Moving down Main Street toward the center of town and the study area, many historical aspects become apparent. This is an early meeting house.

11. (Upper Main Street business/commercial section)

Down the street a short distance we come to the first business district. What effects do you see of this kind of area in the community? (Parking problem, increased signs, etc.)

12. (Railway)

Extending through this area is the railroad. How might this have affected the community? (Caused growth of town, contributed to build up of the business area, etc.) What effects might it now have? (Some interruption of traffic, noise, provides for delivery of some products, etc.)

13. (Railway Station)

The old railway has been converted into a museum by the local Village Improvement Society. The area around it is being developed into a mini-park.

14. (Continuation of upper Main Street commercial area)

Proceeding down Main Street the commercial area continues. In the distance the Route 1 overpass crosses Main Street.

15. (Commercial area continued)

At the foot of the hill in the "hollow," the commercial area stops. Here we are looking back up the street from where we came. What problems are being dealt with? (Parking space provided, curbing separates vehicles from pedestrians, elm trees still standing are evidence of a maintenance program, paving in good condition, etc.)

16. (Institutional area)

In the hollow is the institutional area, so-called, because of its public buildings, e.g., post office, library-town office and school in the distance.

17. (Elementary School and institutional area - aerial)

From the air this area can be observed from the standpoint of how its parts relate to each other and to the river. To the right is Route 1. Between the school and river is the sewage pumping station. Across the river are the remnants of a large paper mill which burned in the 1920's. The old "ash" byproducts of the mill's production processes covers a large area of the surface. Is the school in a good location? Why?

18. (Elementary School)

This is the school as viewed from the ground.

19. (Old paper mill ruins)

The ruins of the old paper mill still exist just beyond the school beside the river. What effect might these have on the area? (Aesthetic, hazards, reminder of the past, etc.)

20. (Open Space and mill ruins - aerial)

From the air the "black ash" can be seen across from the school. This areais owned by the community and tentative plans for an open-space recreational area have been made.

21. (Erosion of "black ash")

Looking from the school side of the river across the top of the sewage pumping station severe erosion of the "black ash" can be seen. How might this affect the river? (Sedimentation, turbidity, etc.)

22. (Picnic area by the river)

Downstream a short distance is a picnic area put in by the Jaycees.

23. (Route 1 and mobile home park corridor - aerial)

Moving down the river corridor across from Route 1 is a mobile home park. On the right side across from the park is the remaining evidence of an old drive-in theater long since discontinued.

24. (Mobile Home Park)

The mobile home park is viewed here from the ground. What, if any, regulation should a community have regarding this kind of development and home?

25. (Route 1 - old drive-in theater)

Across from the mobile home park and behind the new small business establishment is the old drive-in theater. How do land uses change in a community and why do they?

26. (Route 1 - business)

Looking down Route 1 from the old drive-in theater area new businesses are beginning to be developed. What controls, if any, might be necessary? (Signs, parking, traffic, etc.)

27. (Lower Main Street)

Beyond the Route 1 overpass is lower Main Street consisting of a mixture of institutional areas - churches and school facilities - and commercial business. Looking back to the overpass we see the school grounds of North Yarmouth Academy on both sides of the street.

28. (North Yarmouth Academy)

This institution, founded here in 1814, has had an influence on the land use character of this part of the community. How would you describe its influence?

29. (Old homes and churches)

Nearby, looking toward lower Main Street from a side street, we capture something of the history of the town.

30. (Lower Main Street - commercial)

A little beyond is the lower Main Street business section. At this point, how would you describe the land use along Yarmouth's Main Street? (Mixture of old residences, business-commercial, institutional) How would you plan to manage its growth and change?

31. (Royal River Bridge Street dam)

Running parallel to Yarmouth's Main Street is the Royal River. Behind North Yarmouth Academy is the Bridge Street dam.

32. (Royal River below the dam)

Below the dam are the buildings of an early mill. They are still being used for a rug binding industry and for storage. Is the location of industry today determined by the same factors as industries used to be?

33. (Steep slope below the dam)

Behind the old mill looking downstream, the area on the left is still undeveloped. Why would this be? (Steep slope greater than 15%) What do you think the steepness of this slope would be in percent? (greater than 25%) What are some limitations on development imposed by slopes such as this? (Unstable soils, high erosion hazard, thin top soils, etc.)

34. (Royal River below the steep slope area)

Looking back up the river the steep slope area is on the right. A portion of the old mill is seen in the distance. To the left of the river is a flat field area behind the house.

35. (Fall line and flood plain)

A second home exists in this flat area and to the left of it is a small building which is a gauging station. This houses equipment for measuring water height and flow and is used by the U. S. Dept. of Interior Geological Survey. It was built in October of 1949. This area of the river is called the fall line because coming upstream from the mouth of the river these are the first water-falls.

36. (Flood Plain)

Behind the homes and gauging station is a flat fertile area used for crops. The river and steep slope are on the other side of this field. Why hasn't extensive development occurred here? (Flood plain) This is a flood plain, however, it does not flood as often as it once did. Why would this be? (Flooding controlled by the dam above) How has flooding affected this area? (Flat plain of sediment, increased fertility, deep soils, little development).

37. (Wood Products Factory)

Also at the fall line across from the gauging station is another industry - a small wood products factory.

38. (Harbor Area - aerial)

At this point we are entering the Royal River harbor area. The flood plain and wood products factory are at the left of the slide. Early ship-

building made this area once a center for business and activity. Route 95 now cuts off the end of the harbor. In the lower center, a boatyard now exists. In the lower right is a canning factory for fish products. The Yarmouth town landing and road can be seen near Route 95 across the harbor from the boat yard.

39. (Route 95 Overpass)

Here the Route 95 overpass near the boatyard is seen. How do you think this land use affected this area and Yarmouth? (Provided easy and quick routing of heavy through-traffic by Yarmouth; altered the picturesque, historic character of the harbor, increased sound levels for adjacent dwellers, etc.)

40. (Historic area)

Near the Route 95 bridge over the Royal River harbor is one of Yarmouth's many historic sites.

41. (Historic plaque)

Is this kind of a land use valuable to communities? In what ways? (Adds interest, provides a sense of appreciation for the history of the community, etc.).

42. (Sewage pumping station)

In this general area is also found another sewage pumping station. Why might it have been placed here? (Lowest point in town - sea level at high tide - and is needed to pump sewage up hill to the treatment plant).

43. (Boatyard)

Across from the pumping station is the boatyard. The town landing is seen in the distance. How valuable are these land uses to the community? (Aids transportation, provides public access to the water, recreation, etc.)

44. (Harbor and dredging dike)

Across the harbor from the boatyard as seen beyond the old barge in the foreground is a dike which holds dredged sediment when the harbor was deepened a few years ago.

45. (Dike of dredged material - aerial)

From the air, one can see the amount of material removed from the harbor. What does the necessity of such a project suggest to you about the land and land use in the Yarmouth area? (Sediment was carried by the river and deposited in the harbor) The river has a clay bed which erodes easily as does the adjacent land. Land use practices must provide ground cover and erosion controls. The harbor is a valuable resource to Yarmouth and dredging is expensive.

46. (Fish canning business)

Next to the boatyard is the Royal River Packing Company, a business which is based on the fishing resource. Behind the factory is a clay pit. Some of this clay is used by local potters for earthenware.

47. (Clay bank)

What does this tell you about the characteristics of the soil in the Royal River Corridor? (Much clay soil, highly erodable, unstable) Beyond the clay bank is another boatyard.

48. (Harbor - aerial)

The character of the harbor area is seen again from the air. In the foreground is another land use area - a cemetery.

49. (Cemetery)

Viewed here from the ground the cemetery effectively preserves an open space area along the river. Between the river and the cemetery a walking trail has been proposed which would extend along the river bank through the center of Yarmouth.

50. (Sewage Treatment Plant - aerial)

A short way beyond the cemetery is the sewage treatment plant. What do you think were the considerations in locating this facility? (Near sea level to utilize gravity feed as much as possible and avoid expensive pumping, isolated from developed residential areas to avoid odors, opportunity to have efficient flushing of effluent in an area where effects would be minimal, etc.).

51. (Sewage Treatment Facility)

From the ground this plant is well designed and attractive.

52. (Stream and wildlife area)

Near the sewage plant is a stream and habitat area attractive to wildlife. The foot trail has been proposed to go through this area.

53. (Habitat area)

Downstream near the river we view the area again. Are areas like this valuable to a community? Why?

54. (Wetland)

Across the river from the stream a wetland marsh can be seen. Why are these protected by law? (High value for waterfowl and other wildlife, essential to providing nutrients to the ocean and harboring young aquatic organisms, etc.).

55. (Mouth of the Royal River)

At this point we come to the end of the study area. In the distance is the mouth of the Royal River and Casco Bay. Although this study was concerned with land use, we have seen that the way we use the land also indirectly affects our use or abuse of the water. This is yet another illustration of a basic ecological principal . . . everything in our environment is linked to everything else.

CORE ACTIVITY NUMBER FIVE

The purpose of this activity is to involve students in the thinking through of the problem-solving process as it relates to land use problems.

Problem Solving

As a group, select an identified problem area and discuss how it might have occurred. List as many ways as can be thought of to improve it. For each of the improvement alternatives list as many ways as can be thought of that the improvement would affect people and the environment. Discuss and vote on the alternatives the class feels would be the best.

FOLLOW-UP ACTIVITIES

1. (General)

   Take a field trip by bus to observe your community, firsthand. Observe each of the major land use areas and, in particular, visit and discuss each of the problem areas that might exist.

2. (Social Studies)

   Do a study of historic land use areas in the community. Divide the class into teams to study a number of sites. Each term will locate the site or sites on a map, research the history, write a brief tour guide description and lead an interpretive discussion at the site during a field trip.

3. (Science)

   Prepare a soils map of a land use area. Acquire a map of the area from the County Soil Conservation Service (SCS) office. Divide the class into teams to research and sample a particular kind of soil found in the area. Each team will take a soil sample at the site where it is located and record physical and chemical characteristics of pH, fertility, color, texture, depth of horizons, water table depth, and slope. These will then be compared to SCS specifications and rated by the students for a variety of uses. The student ratings may then be compared to SCS soil suitability ratings. Each group of students will then prepare a color coded soil suitability map for a certain land use in the area.

SECTION III

PRE-POST TEST

Student Name_____Grade_____Date_____

COMMUNITY LAND USE ACTIVITY

Pretest/Post-test

Directions: Answer all questions neatly and clearly as instructed.

1. You have been assigned the task of placing all the major ways we either use or manage the land in our communities into six (6) major categories or groups. These represent land use or management areas our communities may be divided into. You have started the list below and are now ready to complete it.

    1) Production Areas (Industries, agriculture, mining, etc.)

    2) Human Settlement Areas (Homes, schools, buildings, cemeteries, etc.)

    3) Recreational Areas (Parks, playgrounds, etc.)

    4) _____

    5) _____

    6) _____

(Circle the letter beside the best answer below)

2. An industrial area:

    a. is best located near water

    b. is always unsightly

    c. is never associated with traffic problems

    d. none of the above

    e. all of the above

3. An old gravel pit:

   a. generally should not concern the community
   b. will in a few years naturally camouflage itself with vegetation
   c. is usually considered as only a safety hazard
   d. none of the above
   e. all of the above

4. A residential area:

   a. is usually developed on land with no other use possibilities
   b. always creates traffic problems
   c. may create water pollution problems if unsewered on steep slopes
   d. none of the above
   e. all of the above

5. An open-space area:

   a. does not usually contain trees
   b. has no use except to be there
   c. might serve to buffer sounds and separate land uses
   d. none of the above
   e. all of the above

6. A highway:

   a. is usually designed to control noise
   b. may be an efficient way of linking land-use areas
   c. has priority over all other land uses
   d. none of the above
   e. all of the above

7. A developed natural park area:

   a. might create increased traffic problems
   b. cannot be over-used if its greatly needed
   c. is more designed for use by people than protection of nature
   d. none of the above
   e. all of the above

8. A power line right-of-way with towers:

   a. can have several uses
   b. does not remove all vegetation
   c. can be designed to be less noticeable
   d. none of the above
   e. all of the above

9. Match the definitions of the terms listed below by placing the letter by a definition in the blank by the term it defines. (Note: there is one more definition than terms)

_____ Flood Plain	A. Identified characteristics, such as slope, texture, depth, etc. which together provide a rating for a particular land alteration or change.
_____ Wetland	B. a measure of the rise of land in a certain distance usually expressed as a percent
_____ Land Suitability	C. an area where the water table is close to or at the surface of the ground
_____ Topography	D. a part of a map which designates the size of the area drawn
_____ Slope	E. the rise and fall of the land surface usually shown by contour intervals, for example, a line drawn for every 20 ft. rise in elevation
_____ Land Use	F. an area where water periodically covers the surface of the ground
_____ Scale	G. an official map showing major land uses and features of a community
_____ Legend	H. refers to the ways land is altered or changed to meet needs
	I. a part of a map which describes symbols used to identify certain features

10. Below are listed a number of land uses which have been proposed for an area. To the left are key items which should be investigated in order to make a decision on the land uses. Match the most important item to investigate with a land use by placing the letter of the item in the appropriate blank at the left.

_____	a ball field	a.	water pollution controls
_____	an old gravel pit	b.	standards for rehabilitation
_____	a fish processing plant	c.	procedure to submitting development plan to the Planning Board
_____	a highway	d.	centrally located to residential areas
_____	an unsewered residential development	e.	plans to minimize detrimental aesthetic effects or appearance
_____	a sewered school	f.	flatness of terrain and ease of access to use
_____	a power line right-of-way	g.	alternative locations to maximize efficiency but minimize environmental impact
		h.	number of people who will benefit
		i.	soil suitability - texture, slope, etc.
		j.	kind of people who will benefit - minorities, etc.

11. Identify the following maps of natural and man-made features by placing the letter beside each map by its name.

_____ Land Use

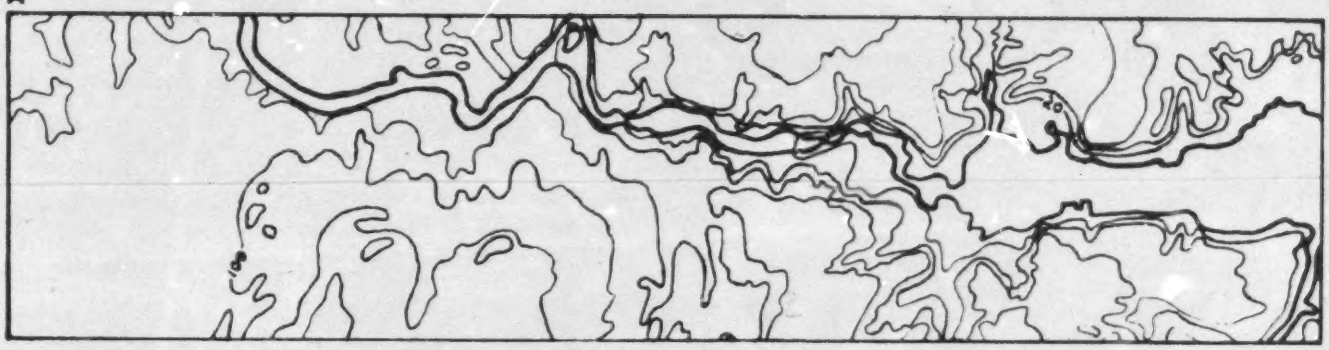
_____ Topography

_____ Soil Suitability

_____ Flood Plain

QUESTION 11 (continued)

A



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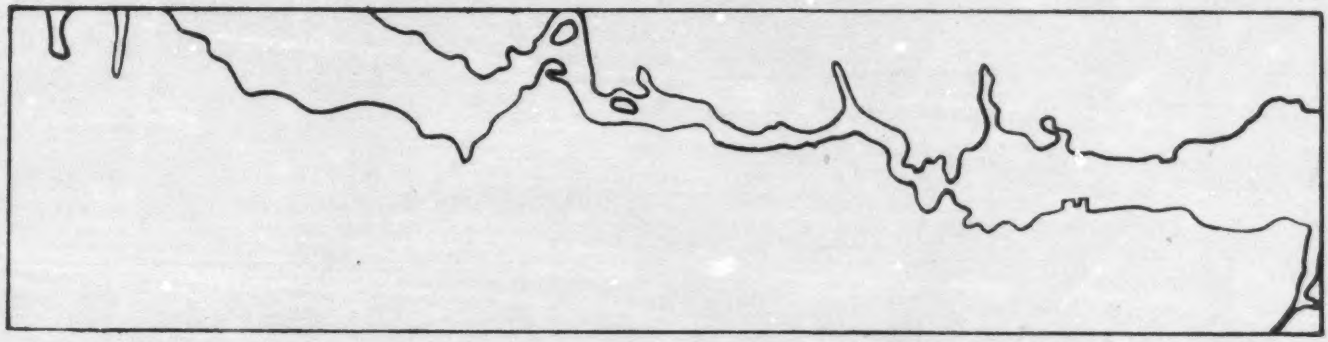

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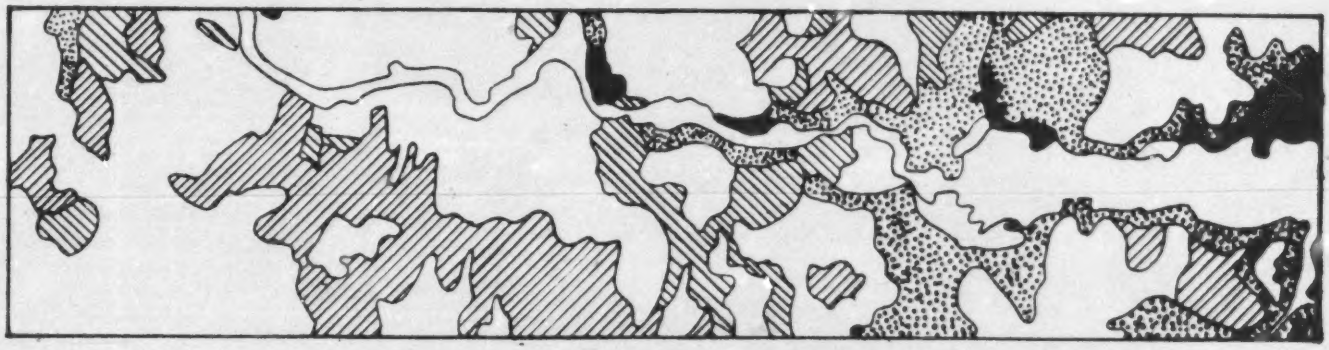
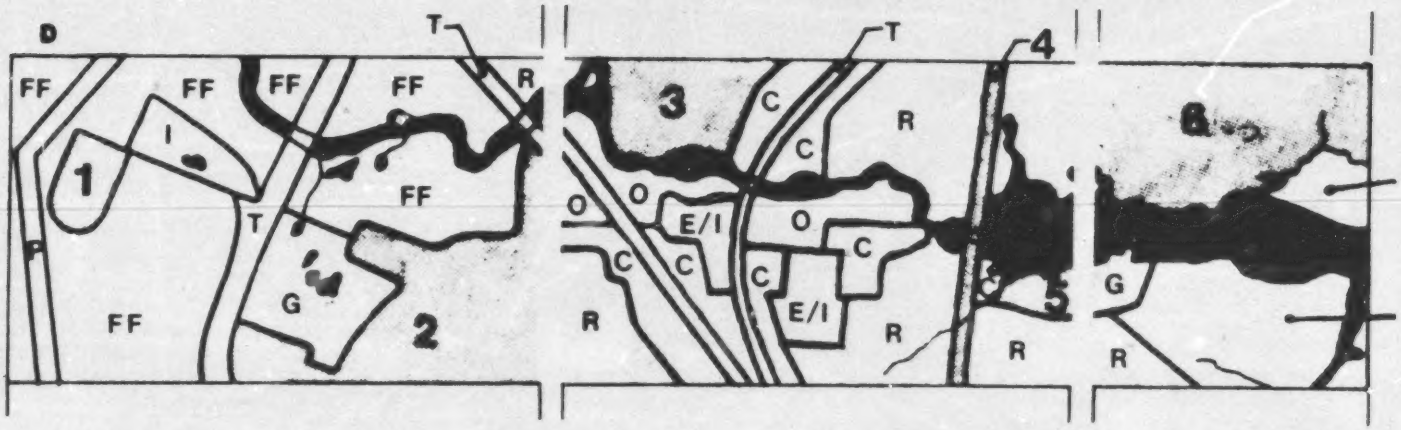


D



12. Below are listed a number of land uses. Some uses are apt to be generally more compatible with all the others than some of the other uses. By compatible is meant they can exist next to other uses or be in combination with them without creating problems. Rank them in order from most compatible to least by numbering them:

(1) being the most compatible

(2) the second most compatible, etc.

Note: You can give some the same number if you judge them equal in compatibility with all other uses.

_____ Industrial

_____ Forest/Farmland

_____ Gravel Pits

_____ Commercial

_____ Residential

_____ Educational

_____ Open Space

_____ Highways/Railways

_____ Playing Fields

_____ Power Lines Right-of-Way

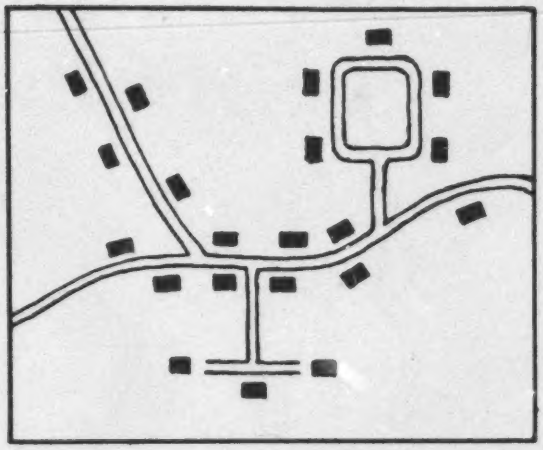
13. On the following page are three maps of a section of a community. One shows existing buildings. The second map shows the suitability of the soil for residences with septic sewage disposal systems. The third map shows the existing public sewage system. Map four shows maps 2 and 3 superimposed over Map 1.

How many houses are likely to have a sewage problem?

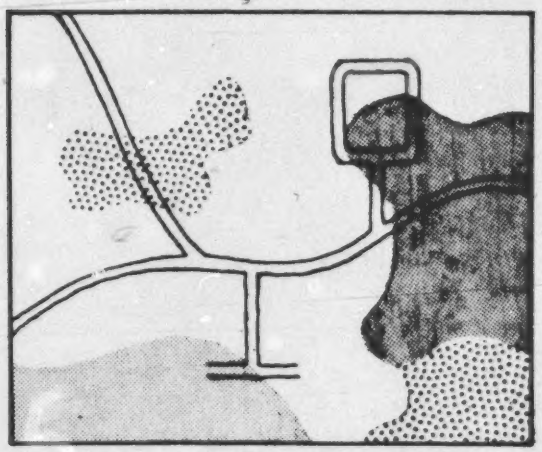
_____

QUESTION 13 (continued)

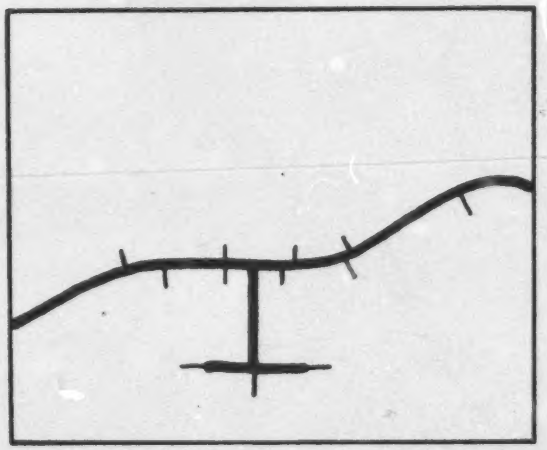
map 1: Existing Housing



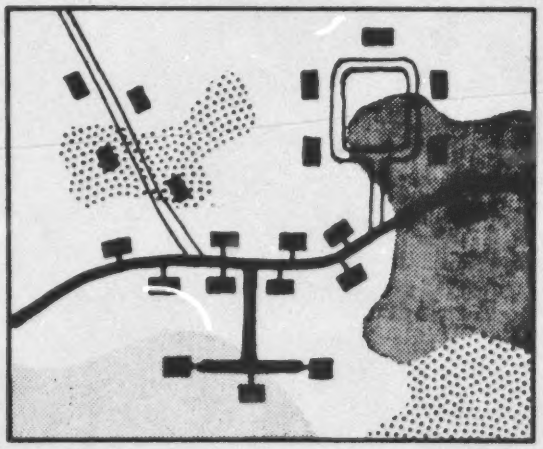
map 2: Soil Suitability for Residences for Septic Sewage Disposal Systems



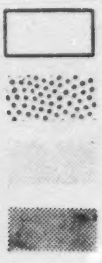
map 3: Public Sewage System



map 4: Maps 2 & 3 Superimposed over Map 1



LEGEND



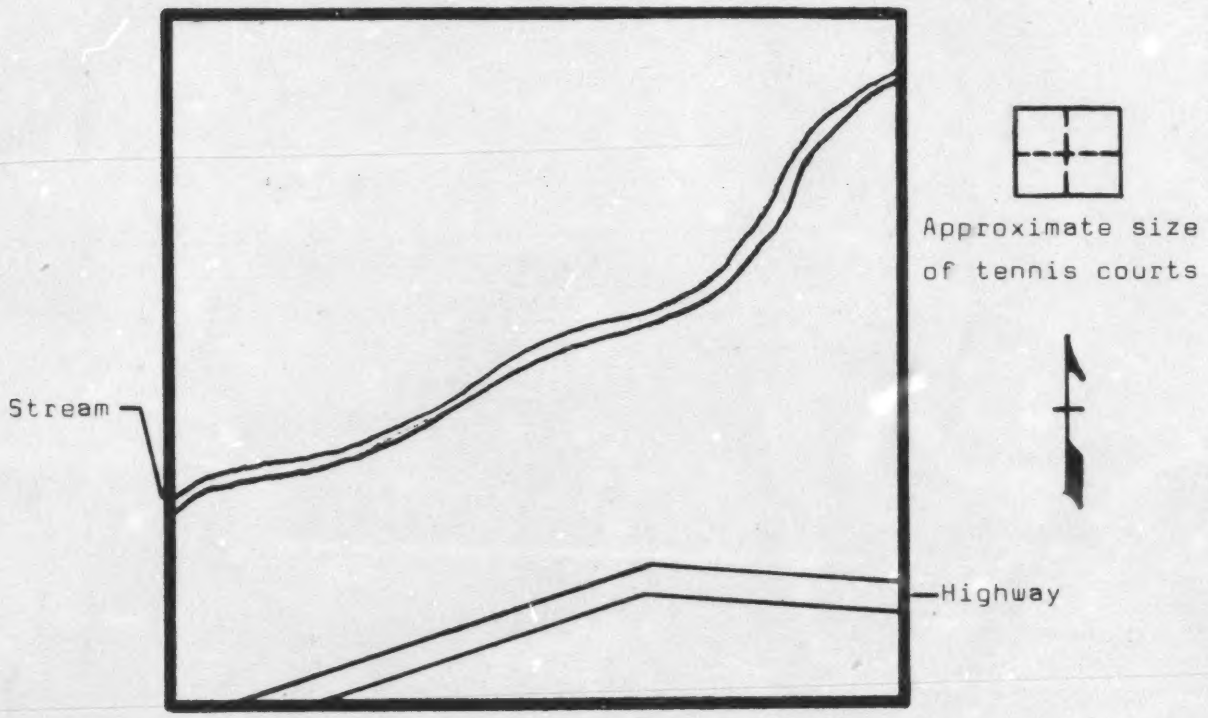
VERY POOR

POOR

FAIR

GOOD

14. You and several other students are on a committee of citizens responsible for planning and overseeing the development of two tennis courts on a parcel of land which the town owns. The funds have been approved at town meeting. Little funding is available for fill. In view of the limited budget your committee must now locate and design the final installation of the courts and oversee the volunteers who will construct them.



Below is a list of possible steps to take in planning and developing the courts. Select the <u>first</u> five <u>most important</u> and <u>appropriate</u> <u>steps</u> and number them in the order in which they should be carried out.

_____ Establish who will use the courts

_____ Determine all facilities needed, their requirements, such as courts, parking, etc. and their possible location

_____ Develop a maintenance schedule

_____ Set up a work construction schedule

_____ Determine a time schedule for use of the courts

_____ Establish a final plan with landscaping

_____ Determine the high water level of the stream

_____ Choose the best locations of all facilities

_____ Secure a topographic map showing slopes and elevations

_____ Determine the need and cost for lighting